
**SOME NOTES ON
ETHNOGRAPHIC SUBSISTENCE SYSTEMS
IN MOJAVEAN ENVIRONMENTS IN THE GREAT BASIN**

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ABSTRACT.—Subsistence resources utilized by Southern Paiute and Shoshone peoples in the Mojave Desert of western North America near the time of extensive contact and disruption of their lifeways in the 1840s have been little discussed in the ethnographic literature. In the 1930s, Isabel Kelly worked with a number of Southern Paiute groups in this desert, and her unpublished field notes, as well as some additional data, help to outline their subsistence systems. Recent studies among the Timbisha or Death Valley Shoshone also elucidate aspects of their subsistence cycles. Although these groups share a number of subsistence aspects with their linguistic kinsmen in the Great Basin Desert to the north, they also developed some unique foci based on certain locally occurring resources such as legumes, agaves, and yuccas, as well as tortoises, and chuckwallas. The spread of garden horticulture into the eastern part of the region prior to the mid-1700s probably added an important margin to the indigenous subsistence systems in this dry area.

RESUMEN.—Los recursos para la subsistencia utilizados por los pueblos Paiute Sureño y Shoshone del Desierto Mojave del occidente de Norteamérica hacia el período de contacto extensivo y perturbación de su forma de vida en los años 1840 han sido poco discutidos en la literatura etnográfica. En los años 1930, Isabel Kelly trabajó con un número de grupos Paiute Sureño en este desierto, y sus notas de campo inéditas, así como algunos datos adicionales, ayudan a esbozar sus sistemas de subsistencia. Estudios recientes entre los Timbisha, o Shoshone del Valle de la Muerte, esclarecen también algunos aspectos de sus ciclos de subsistencia. Si bien estos grupos comparten un buen número de aspectos de la subsistencia con sus parientes lingüísticos en el Desierto de la Gran Cuenca hacia el norte, también desarrollaron algunos focos particulares basados en ciertos recursos de distribución local, como leguminosas, agaves y yucas, así como tortugas y lagartijas. La expansión de la horticultura a la porción oriental de la región antes de mediar el siglo XVIII probablemente agregó un margen importante a los sistemas indígenas de subsistencia en esta área árida.

RÉSUMÉ.—Les ressources utilisées par les peuples Paiute de Sud et Shoshone dans le désert du Mojave d'Amérique du Nord occidentale, aux abords des années 1840, période de contact important et de dérangement de leurs mœurs, figurent peu dans la littérature ethnographique. Pendant les années 1830, Isabel Kelly fit des recherches dans un nombre de groupes Paiute du Sud dans ce désert, et ses notes non publiées, ainsi que d'autres données, servent à reconstruire leurs moyens de subsistance. Des études récentes des Timbisha ou Shoshone de Death

Valley servent également à élucider certains aspects de leurs cycles de subsistance. Bien que ces groupes partagent plusieurs aspects de leur subsistance avec leurs parents linguistiques du désert du Great Basin au Nord, ils ont également développé certaines spécialisations d'après les ressources locales telles que les féculents, l'agavé et le yucca, ainsi que les tortues et les chuckwallas. Le déploiement de l'horticulture vers l'est de la région avant la moitié du 18^e siècle contribua certainement une marge importante aux moyens de subsistance indigènes dans cette région aride.

INTRODUCTION

Ethnographic subsistence systems for the Great Basin of western North America have been defined in the past largely as focused on cold desert resources. This is because much of the published field work deals with groups in the Great Basin Desert, a relatively high, arid, and cold regime (see, for example, Chamberlin 1911; Fowler 1986, 1989, 1992; Kelly 1932, 1964; Smith 1974; Steward 1933, 1938, 1941, 1943; Stewart 1941, 1942; Shimkin 1947; Zigmond 1981). However, a significant number of the native peoples of the Great Basin culture area lived in and depended upon the resources of hot deserts, particularly the Mojave Desert (Fig. 1), a lower, dryer, and warmer regime.¹ In historic times, groups in the Mojave Desert included several subgroups of the Southern Paiute (Las Vegas, Pahrump, Moapa, Shivwits, St. George, Chemehuevi), the Timbisha (Death Valley), Panamint Valley, and Koso Shoshone, and some adjacent Kawaiisu. Non-Great Basin (or non-Numic-speaking) groups also in this desert and with whom Great Basin peoples shared much in terms of subsistence and other features of adaptation included, among others, the Cahuilla, Serrano, Mohave, and some Walapai subgroups. By focusing subsistence around floral and faunal species common to both the Great Basin and the Mojave deserts, but also on certain key Mojavean resources (e.g., legumes, agaves, and yuccas; desert tortoises and chuckwallas), all of these groups learned to cope with the Mojave's seeming harshness. In historic times, some of these groups also supplemented these naturally occurring products with several derived from garden horticulture.

In this paper data on the distribution and character of the subsistence complexes focused on the uniquely Mojavean resources are discussed for the Great Basin groups. What is known of the history and importance of gardening among them is also reviewed. Sources for these data include the extensive unpublished notes of Isabel Kelly (1932–34) for the Southern Paiute,² the author's field data for Southern Paiute in the Mojave Desert (Fowler 1968, 1986–1990) and for the Timbisha or Death Valley Shoshone (Fowler 1992–1993), and certain published materials (e.g., Bell and Castetter 1937, 1941; Castetter et al. 1938; Coville 1892; Irwin 1980; Laird 1976; Schroth 1987; Steward 1938; Stuart 1945; Wallace 1980; Zigmond 1981). Unfortunately, since all of these data were gathered long after Mojavean subsistence systems ceased to function in their entirety, the data suggest more of the "what" and "how" than of the "how much" and "how often" of the use of these resources. Statements of consultants regarding these other aspects are occasionally included, but cannot now be verified.

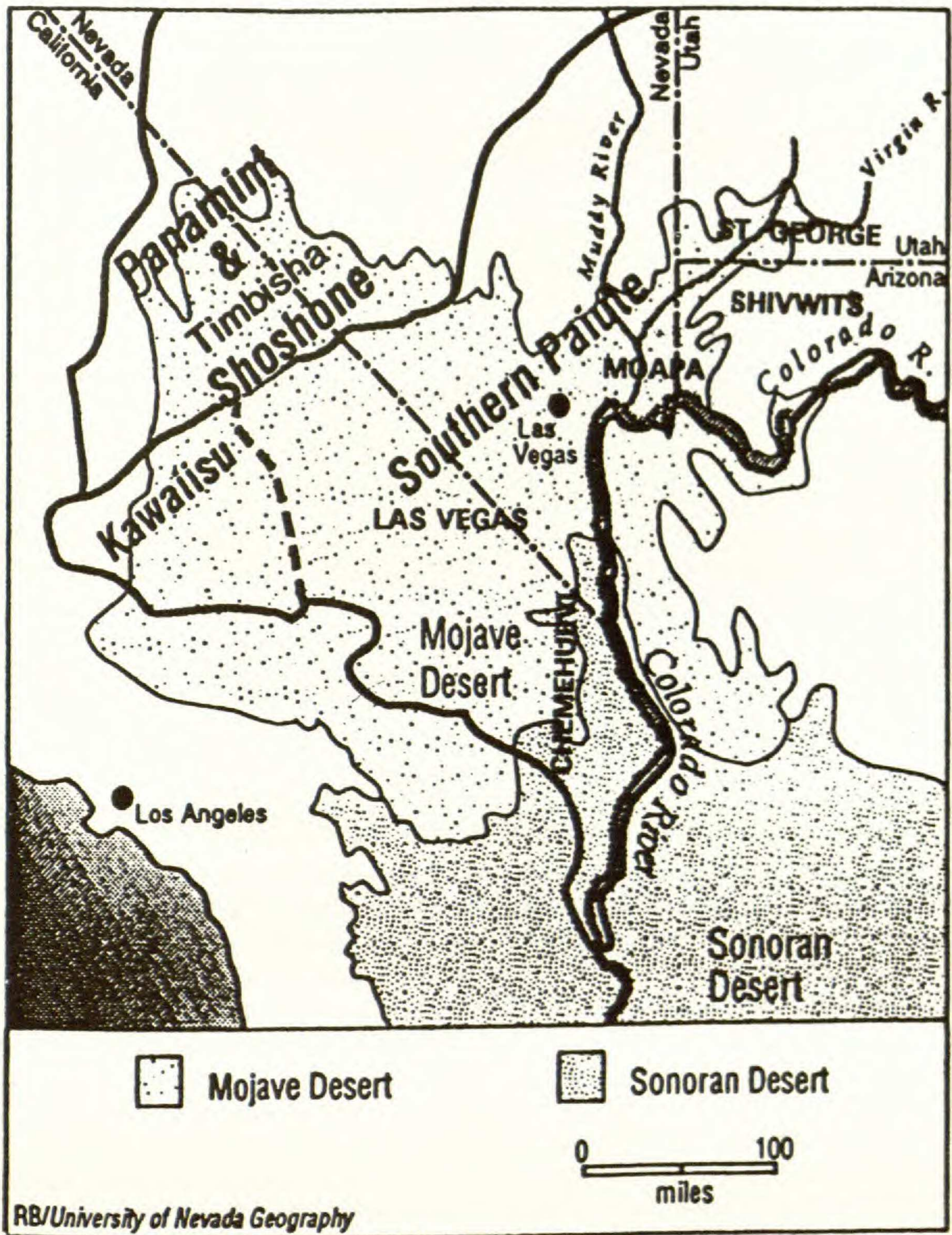


FIG. 1.— Great Basin Tribes in Mojave Desert environments.

FLORAL RESOURCES

The mesquite complex.—The term *mesquite complex* has been previously applied to the series of procedures involved in gathering and making edible certain members of the Fabaceae, including primarily honey mesquite (*Prosopis glandulosa* Torr. var. *torreyana* [L. Benson] M.C. Johnston) and screwbean (*P. pubescens* Benth.; see Bean and Saubel 1972; Fowler 1986:67; Schroth 1987). These, as well as certain

other members of the family (e.g., *Acacia* spp.), are important components of the Mojavean flora as well as that of the adjacent Sonoran Desert. They were likewise important in the diets of Southern Paiute and Shoshone peoples (but not Kawaiisu [Zigmond 1981:54]), in some local areas replacing the all-important pinyon and/or acorn, or at least standing equal to them. It is difficult today to judge the former distribution, and especially the density and productivity of mesquite groves properly, as many have succumbed to drought brought on by the tapping of groundwater resources to salve the seemingly insatiable thirst of modern Mojave Desert dwellers. However, their focal distributions seem once to have been most of the drainage patterns throughout the Mojave (Benson and Darrow 1981). Screw beans were of more limited occurrence, but equally favored where found.

Pods of honey mesquite (called *ohbi* in Timbisha Shoshone and *obi* in Southern Paiute) were used slightly differently by Shoshone and Southern Paiute people, with additional differences probably occurring among families. Among the Timbisha Shoshone, a first use was made in the spring when the pods were green but still flat.³ These pods were pit-roasted on a layer of hot stones, with the result being a tart-tasting product that was not to everyone's liking. Kelly (1932–1934:LVI:99;M:44;CI:40;SG:23) did not report this use among the Southern Paiute. However, the Moapa and Pahrump Southern Paiute as well as the Timbisha Shoshone ate the green pods raw as snacks at a slightly later stage—after the seeds had formed. For this purpose people with several mesquite groves or trees to choose from sampled different trees until they found those with the sweetest pods. They then collected what they wanted from these special trees (Fowler 1986–1990; 1992–1993).

More elaborate processing attended the taking of mesquite later in the season, after the pods had begun to ripen or had dried.⁴ Southern Paiute people collected ripened but still green pods from the trees, then pounded them into a pulp in stone mortars with stone pestles. They made a drink from the resulting pulp (Kelly 1932–1934:LVI:99;M:44;CI:40). The Timbisha and Panamint Shoshone people apparently waited a little later, until the pods had turned yellow and had begun to drop from the trees. They pounded the still moist pods in large tree-stump mortars (Fig. 2)⁵ with cylindrical stone pestles and also made a juice, squeezing it from the remaining pulp. Old people could drink all of this sweet-tasting juice that they wanted, but young people were cautioned that too much of the mixture would make them drowsy (Fowler 1992–1993).⁶

Shoshone and Southern Paiute peoples both made use of mesquite pod meal made from fully ripened fruit. As a first step, the pods were laid out to dry to remove all remaining moisture. They were then pounded into a fine powder (principally the mesocarp), a process that took considerable time and strength given the toughness of the exocarp and the endocarp surrounding the seed within a pod. The meal was further sifted in an open-twined tray to remove any unground material, especially the endocarp and seeds.⁷ The Timbisha Shoshone then set aside both types of material to be used to prepare large meal cakes for storage.

The Timbisha Shoshone apparently prepared their cakes for storage in flat winnowing trays, while at least the Moapa Southern Paiute used conical burden



FIG. 2.—Mesquite bean mortar collected in Saline Valley, CA, in 1959 (Eastern California Museum, Independence, A850; 32 cm).

baskets (Stuart 1945). The Timbisha people first lined a winnowing tray with the fiber retained from the pounding process, material called *kahimbi*. The meal was then formed into a cake on the tray, with water being sprinkled between the layers to help them pack more tightly. The cake, as much as a foot or more high, was then covered with an additional layer of *kahimbi*, wetted to form a crust. The cake, called *pigibi*, could then be sun-dried, removed from the tray, and cached in a grass-lined pit (Fowler 1992–1993). The Moapa Southern Paiute built their cakes either in conical burden baskets, or in a small hole dug to shape and lined with mesquite pod pulp (Kelly 1932–1934:M:44). Their cakes were as much as 2 feet thick. After a few days, the baskets were inverted and the large cones of meal left to dry further; or the cakes were removed from the pits for the same purpose. The cones and cakes were then stored in grass- or bark-lined pits in rockshelters or caves, or in underground pits on bluffs or ridges (Stuart 1945). Both groups kept a cone or cake in the house and people removed pieces and ate them without further preparation, or added them to water for juice. The Moapa people also stirred dried mesquite meal into cooked agave and made the resulting mixture into small cakes. These were suitable for the trail or for meals in camp (Stuart 1945).



FIG. 3.—Screwbean (*Prosopis pubescens* Benth.) near St. George, UT.

Dried pods were often stored and processed later, although there was considerable danger of insect damage if storage was prolonged. The common predator is bruchid larvae that eat the seed and the mesocarp, and then pupate within the pod (Kingsolver et al. 1977:110f). Processing before the larvae emerge (some overwinter in the pod) was favored by the Timbisha people, who recognized their value as food. They cached mesquite pods in subterranean pits lined with arrowweed (*Pluchea sericea* [Nutt.] Coville) and capped with earth at valley sites near Furnace Creek before moving to the mountains for the summer.⁸ A site containing such a cache was excavated in Breakfast Canyon near Furnace Creek in 1992 (Yohe and Valdez 1993). The beans were then processed in the fall upon their return (Fowler 1992–1993).

Kelly (1932–1934:M:44) reports for the Moapa Southern Paiute some family ownership of mesquite groves near cultivated fields. The same is not mentioned for Las Vegas, Pahrump, or Chemehuevi groups, although the latter knew that it was a Mohave custom (Kelly 1932–1934:CI:40). Steward (1938:183) reports family ownership of groves in Ash Meadows, an area jointly occupied by Shoshone and Southern Paiute people. Timbisha people felt more possessive about the mesquite at Furnace Creek, their home district, but were willing to trade their surplus. Kelly (1932–1934:SG:23) was told that mesquite was rare and little utilized at St. George, and absent from the original Shivwits district. Schroth (1987) reviews concepts of ownership as well as other distributions among non-Great Basin Mojave Desert dwellers.

Screwbeans (Fig. 3), although not nearly as common as mesquite, were important and favored by all of the people fortunate enough to have them in their

districts. According to Kelly (1932–1934:LVI:100;CI:41), for the Las Vegas and Pahrump Southern Paiute and the Chemehuevi, processing of these involved an additional step—pit ripening. Once the screwbeans had been obtained, they were placed in layers in an arrowweed-lined pit, water being sprinkled between the layers. A man stood in the pit to tamp down the pods. The pit was then covered with more arrowweed and a clay cap and allowed to sit for about a month. When the pit was opened, the screwbeans had changed color—from tan to red. They were then removed and placed in storage granaries or processed into meal using a stone mortar.

Screwbeans have tiny, very hard seeds, most of which are not easily ground except by special attention. According to Kelly (1932–1934:LVI:100), the Las Vegas and Pahrump people removed the seeds from the mortared meal mixture by tapping them to the edge of a winnowing tray. The seeds could then be ground on a metate and made into additional meal. Most people apparently preferred to mix the ground seed with water to make a drink. The pod meal of screwbeans could be eaten prepared as a drink, or made into dried cakes similar to those of mesquite. Ripened screwbeans were widely traded, especially within Southern Paiute territory. Kelly (1932–1934:LVI 100) states: "Many used to trade rabbitskin blanket, sheep hide, eagle feathers, sinew, anything they had, for screwbean."

Although pit-ripening of screwbean is also reported for the Mojave and Yuma (Drucker 1937:47; Kroeber 1925:737; Castetter and Bell 1951:179), it is by no means universal to the area (Bean and Saubel 1972) nor is its function fully understood. Kelly (1932–1934:M:44) does not report it for the Moapa people, and the Timbisha Shoshone have not heard that it was necessary. In the tree-ripened state (usually by fall), screwbeans have a sweet flavor when raw.⁹ Perhaps pit-ripening hastens the process or enhances the flavor. It may also cause a slight fermentation, but such is not reported. Whatever the effect, those who had screwbeans within their areas seem to have made good use of them, and, if they had enough to trade, they could exact good prices.

The agave complex.—Like mesquite and screwbean, agaves are primarily confined to the Mojave and Sonoran deserts in the southern Great Basin, but also have broader distributions south of that. Common species in the Mojave Desert include *Agave deserti* Engelm. (Chemehuevi territory only) and *Agave utahensis* Engelm. ssp. *utahensis*, *A. utahensis* var. *nevadensis* Engelm., and *A. utahensis* ssp. *kaibabensis* (McKelvey) Gentry. *Agave utahensis* varieties are found in scattered distributions at mid-level elevations in the Mojave Desert (principally Southern Paiute territory), with *A. utahensis* ssp. *kaibabensis* occurring at higher elevations and extending along the north rim of the Grand Canyon through the territory of the Kaibab Southern Paiute. The agave complex, where it is found, shares many features with like complexes in the Southwest and Mexico (Castetter et al. 1938).

According to Kelly (1932–1934:LVI:94–5;CI:37–9;SH:30;SG:22), for the Southern Paiute and Chemehuevi, processing of agave (*yantî*, *nantî*) began in the early spring (February or March, depending on elevation) with collection of plants just as they were sending up flower stalks. The plants were severed from their roots using a chisel-shaped wooden wedge and a special knife (Fig. 4). The leaves were often trimmed to within 1 or 2 inches of the base with the knife and the agaves returned to a central processing location in special pack frames. A large pit was

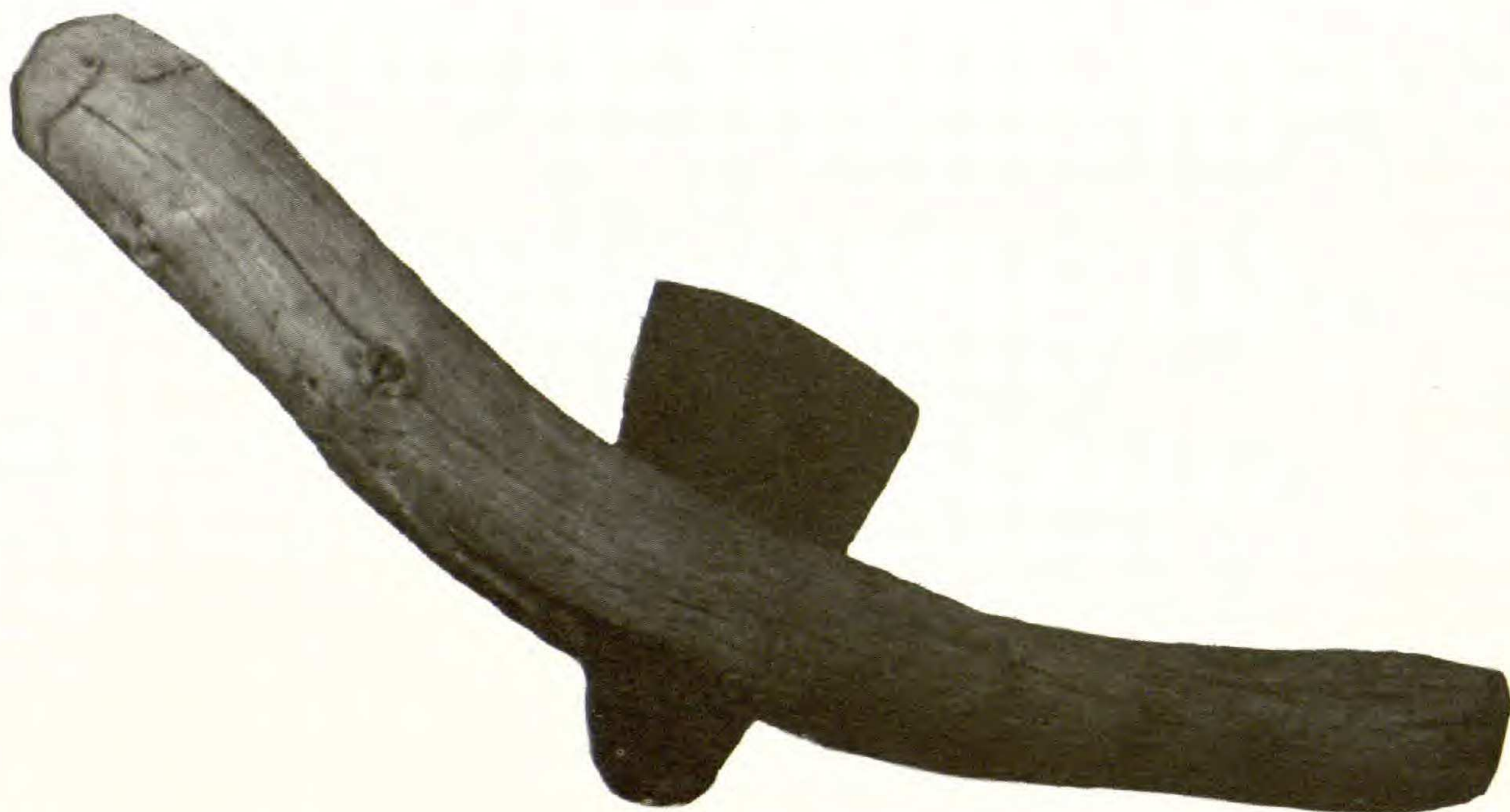


FIG. 4.—Agave knife with metal blade, collected at Moapa, NV, in 1929 (National Museum of the American Indian, 16/4059; 29 cm).

dug and a fire built in it. After the fire died down, rocks were added to the pit and each family placed its agaves in a section of the pit. More rocks were added and a fire built on top. The pit was left unopened for 24 to 48 hours, during which time singing and dancing took place. Prohibitions were also in effect to insure good baking. After the pit was opened, the sweet, dark mass, and any still partly intact hearts, was removed by each family and cooled, pounded, and formed into large, flat cakes for drying and storage. Portions were also eaten fresh out of the pit. Agave was mixed with other types of meal or meats and made into stew.

According to Kelly (1932-1934:CI:38;LVI:94;M:34;SH:30), the spring harvesting and cooking of agave, especially by the Shivwits, Moapa, Las Vegas, and Pahrump Southern Paiute and by the Chemehuevi, was under the direction of a male or female specialist (sex depended on area). This person supervised the activities, sometimes lit the fire,¹⁰ and also offered special prayers for the success of the roast. There are no data indicating that agave collecting areas were family owned.

The Timbisha Shoshone apparently did not have agave within their territory, nor did other Panamint Shoshone except perhaps the people in the Koso district (Driver 1937:64). Agaves also seem to have been lacking in Kawaiisu territory (Zigmond 1981).

The yucca complex.—There are several species of yuccas found in the Mojave Desert, one of the most characteristic being the Joshua tree (*Yucca brevifolia* Engelm.). All groups with Joshua trees (Southern Paiute *tsoadimpi*; Timbisha Shoshone *muupi*) in their territories made similar uses of them, especially in the spring. At that time the new growth tips containing what will be the flowering and fruiting heads (Fig. 5) were carefully twisted from the ends of the stalks and pit-roasted in coals (Coville 1892:355). If sharp spines remained, these were cut away and the bud was eaten much like an artichoke. Joshua trees left to flower



FIG. 5.—Joshua tree (*Yucca brevifolia* Engelm.) with growth tips ready to harvest.

had their blossoms harvested as they emerged—these, too, being pit-roasted. Those left to fruit had the fruit collected, although not all people and groups preferred these. The Death Valley Shoshone ate them (called *paki*); the Southern Paiute did not.

Other yuccas, including commonly *Yucca schidigera* Roezl ex Ortgies, *Y. bacatta* Torr. and *Y. whipplei* Torr., were also favored for fruit and stalks. Kelly (1932–1934:LVI:97) reports an interesting process in use among the Las Vegas Southern Paiute to hasten ripening of *Yucca schidigera* (*uwimpi*) fruits: the stem containing them was broken but not severed from the plant. Ripening could also be speeded by burying the fruit in a pit covered with earth. Once ripe, the fruits were split and the seeds removed. They were then buried under ashes or roasted on coals. Later, after being in storage, they were boiled and mashed “just like apple sauce.”

Yucca bacatta (*uusi*) fruits were split, seeded, and dried, and sometimes formed into balls or pounded into flattened sheets. The resulting product was set out on mats to dry in the sun (Kelly 1932–1934:CI:44;SH:39;SG:21). The sheets were later carefully folded for storage and covered with bark for caching in rockshelters or in juniper trees. The sheets were then ground into flour and made into mush or loaves like agave (Kelly 1932–34). The newly emerging stalks and blossoms of narrow-leafed yucca (*Y. angustissima* Engelm. ex Trel.) were eaten, but not the fruit. It was considered too bitter and dry (Fowler 1986–1990). Zigmund (1981:69) reports that the Kawaiisu treated the “hearts” of *Yucca whipplei* much like other groups treated agave, with ceremony and prohibitions surrounding the pit-roasting of this species in the spring. The Kawaiisu also roasted the split, green flower stalks, but seem not to have used the fruit.

Other floral resources.—Although definitive ethnobotanies are lacking for most Great Basin Mojave Desert dwellers, several combined sources document, in addition to the plants already described, the use among these peoples for food of more than 20 genera that produced seeds (*Sporobolus*, *Descurainia*, *Suaeda*, *Poa*, *Atriplex*, *Amaranthus*, *Salvia*, *Rumex*, *Oenothera*, *Allenrolfea*, *Oryzopsis*, *Mentzelia*, *Dicoria*, etc.), several leafy plants for greens (i.e., *Stanleya pinnata* [Pursh] Britton, *S. elata* M.E. Jones), several fruits (*Lycium*, *Opuntia*, among others), a few roots/corms (i.e., *Calochortus kennedyi* Porter, *Dichelostemma pulchellum* [Salisb.] Heller, *Allium* spp.), and, where possible, pinyon (*Pinus monophylla* Torr. & Frem., *P. edulis* Engelm.) and scrub oaks (*Quercus turbinella* Greene, *Q. gambelii* Nutt.) (Coville 1892; Fowler 1986–1990; 1992–1993; Irwin 1980; Kelly 1932–1934:LVI:85–9;M:37–9;CI:30–2;SG25–6; Wilke et al. 1979). Zigmond (1981) lists roughly 100 species of plants used for food by the Kawaiisu, including a number of non-Mojave Desert species. Bean and Saubel (1972) list roughly 75 species utilized for food among the adjacent Cahuilla, also people not wholly within the Mojave Desert.¹¹

Taken in their entirety, the floral complexes of the Mojave Desert probably allowed for about as varied a subsistence system as those of the more northerly Great Basin Desert; but the presence of agaves, yuccas, and the legumes also provided some unique features. The Timbisha Shoshone rank mesquite as co-equal to pinyon in their plant subsistence system (Fowler 1992–1993). The Moapa Southern Paiute stored as much if not more mesquite and agave than they did pine nuts and berries—which were sometimes hard to get (Fowler 1986–1990; Kelly 1932–1934:M:47). Whole camps of Chemehuevi people went after agave each year, so much so that the river camps were nearly deserted. Kelly (1932–1934:ChI:38) states: “Could tell from great distance when people gathering mes-cal; could see fires on all the mountains.” Thus, the use of these plant groups set the southern groups somewhat apart from their northern kinsmen, giving them additional storable staples upon which to depend in good years. In poor years, all groups looked for alternatives.

FAUNAL RESOURCES

Mammals and reptiles.—Just as with floral resources, the Mojave Desert faunal community fostered certain specializations. According to Kelly (1932–1934:LVI:108) for the Southern Paiute, more of the day-to-day animal protein came from rabbits, wood rats, tortoises, and chuckwallas than it did from deer or bighorn sheep. Of the latter two, desert bighorns (*Ovis canadensis* ssp. *nelsoni* Merriam) were the more common, being found in most Mojavean areas. Some Southern Paiute groups, on the other hand, had to go into the adjacent territory of the Timbisha (Death Valley) Shoshone or Cahuilla in order to take more than an occasional deer (*Odocoileus hemionus* Rafinesque). If they wanted hides, they organized communal hunts to these areas, or went on trading expeditions (Kelly 1932–1934:LVI:108). Even the Timbisha people considered deer rare in mountains surrounding central Death Valley, noting that they were taken only on the west side of the Panamint Range.

Bighorn sheep and deer were more commonly hunted by individuals or by small groups of men under the direction of a dreamer—a different dreamer being

required for each type of large game animal (Fowler 1986–1990; 1992–1993; Kelly 1932–1934:LVI:115;M:52;CI:57;SH:48). Dreaming for big game animals in this region is related to the same practices to the south and west, as among the Mojave, Cahuilla, and others (Kroeber 1925).

Rabbits, including cottontails (*Sylvilagus audubonii* Baird) and hares (*Lepus californicus* Merriam), were often hunted and snared individually using bag nets or noose snares set in their trails. They were taken in mesquite thickets and near agricultural fields, once those were established. They were also taken in drives with linear nets on occasion, and in certain areas (Irwin 1980; Steward 1938). In the Las Vegas valley, Kelly (1932–1934:LVI:114) reports that the brush was fired in the spring to take young cottontails and jackrabbits, which reportedly ran about confused in the face of fire. Cottontails could also be extracted from their burrows with hooked sticks twisted into their fur (Fowler 1992–1993; Kelly 1932–1934:LVI:113).

Desert woodrats (*Neotoma lepida* Taylor) were often sought in mesquite thickets where they constructed their large nests. They were extracted from the nests with hooked sticks, or occasionally, by setting fire to the nest (Fowler 1992–1993; Kelly 1932–1934:LVI:121;M:59). Chuckwallas (*Sauromalus obesus* Baird) were similarly extracted from crevices in the rocks with a hooked stick (Wallace 1978).¹² The Timbisha people roasted them in a bed of coals with hot, flat stones on top (Fowler 1992–1993). They were very fond of chuckwalla, so much so that people in northern Death Valley often referred to them as “chuckwalla-eaters.” The Chemehuevi, Las Vegas, and Moapa people prepared chuckwallas the same way as the Timbisha people, and also used the hooked stick to extract them from the rocks (Kelly 1932–1934:LVI:116;M:60). The Moapa people held a boy’s first game ceremony when he killed his first chuckwalla, suggesting something of the importance of this animal (Kelly 1932–1934:M:53). Prime hunting times varied with elevation, but usually spring and summer were the favored seasons.

Hunting desert tortoises (*Gopherus agassizii* Cooper), reported to have been common to most Mojavean areas, could be risky business, according to what Kelly (1932–1934:LVI:117) was told. They were usually extracted from their burrows with a crooked stick, but first the hunter had to make sure that the hole was not occupied by a rattlesnake. In order to determine if a tortoise were present, a rock was thrown at the hole. The tortoise—or rattlesnake—made a characteristic noise if present, or emerged (see also Schneider and Everson 1989:186 for similar comments). Tortoise meat was cut away from the shell and pit-roasted in the ashes. The carapaces were used as eating utensils and digging tools (Fowler and Matley 1979). Most Southern Paiute (and Chemehuevi) groups in the Mojave Desert ate desert tortoises and their eggs; the Death Valley and Panamint Shoshone apparently did not (Fowler 1992–1993; but see Driver 1937:62 for a different opinion).

There is little information on bird hunting among these groups, although from the brief notes of several authors most groups took at least doves (*Zenaida* spp.) and Gambel’s quail (*Callipepla gambelii* Gambel) from blinds near water holes and collected their eggs (Fowler 1992–1993; Irwin 1980:19; Kelly 1932–1934:LVI:118;M:66;CI:70;SG:35; Sh:55). Some groups also had access to a few waterfowl in certain seasons, and also took a few other small birds or their eggs when encountered.

Although animal protein was not all that plentiful in the Mojave Desert, other foods were apparently sufficient to have suggested some animal food taboos. Most groups did not eat members of the dog family except as famine foods. Cats were similarly avoided by most, but bobcats were sometimes taken. The larvae of some insects were eaten (Sutton 1988), but not grasshoppers, most caterpillars, or angleworms (Driver 1937; Kelly 1932–1934; Steward 1941). Racoons, although field-hunted to keep them from eating or ruining agricultural products, were generally not eaten by the Southern Paiute who had them in their districts (Kelly 1932–1934:M:58; CI:71;LVI:126). Southern Paiute people adjacent to the Colorado River were also not keen on fish, eating them only occasionally (Drucker 1937; Kelly 1932–1934:CI:69;M:63;LVI:126; SG:35). The Timbisha Shoshone occasionally ate desert pupfish (*Cyprinodon* spp.; Fowler 1992–1993). Ground squirrels and other small rodents were also taken, often by children looking for a ready meal (Fowler 1992–1993). Adults trapped them with figure-4 traps, but some considered them not worth the trouble unless they were known to be locally plentiful (Fowler 1992–1993). Perhaps certain aspects of this selectivity were brought about by a considerable involvement with gardening, especially among the Southern Paiute, but also historically among the Timbisha and Panamint Valley Shoshone.

HORTICULTURE

There is a great deal that is not known about the practice of garden horticulture among the Southern Paiute and adjacent Shoshone. Although the ultimate origins of the crops—principally corn, beans, squash, sunflowers, and amaranth—are clear enough, it is their more immediate source or sources as well as the source of the planting and irrigation techniques that are in doubt (see Euler 1966 for ethnohistoric references). Elsewhere it has been argued based on linguistic evidence that at least one immediate source of cultigens among the westernmost Southern Paiute was the Lower Colorado River agricultural complex, as practiced by various Yuman groups (Fowler and Fowler 1981). But the Hopi and Pai peoples were probably involved in crop transfers as well. Based on data obtained in the 1930s, Kelly (1964:39) doubted that the practice in the more easterly Southern Paiute areas predated by much the arrival of the Mormons in the 1850s; but in the Mojavean areas, it was certainly well established by at least 75 years earlier (Fowler and Fowler 1981; see also Euler 1966). Timbisha Shoshone practices probably postdate the 1840s (Wallace 1980), while those of the Panamint Valley people may be later (1880s?).

Kelly's (1932–1934:LVI:62–78;CI:18–27;M:26–30;SG:11–20;SH:40–41) unpublished field notes help to document in more detail the nature of Southern Paiute horticultural practices. Her data from the St. George and Moapa areas specify the following: (1) land for gardens had to be level and near a stream with a low bank; (2) the ground was cleared by hand, using a flattened stick, both sexes participating; (3) the main ditch was dug at right angles to the stream and the laterals ran from it parallel to the stream—there was no exit back to the stream; (4) sometimes there was overflow, but there is no indication in Kelly's notes that she asked whether unintentionally watered ground was harvested for wild plants; (5) the ditch was dug with the same flat stick used for clearing (Kelly 1932–1934:SG:12).

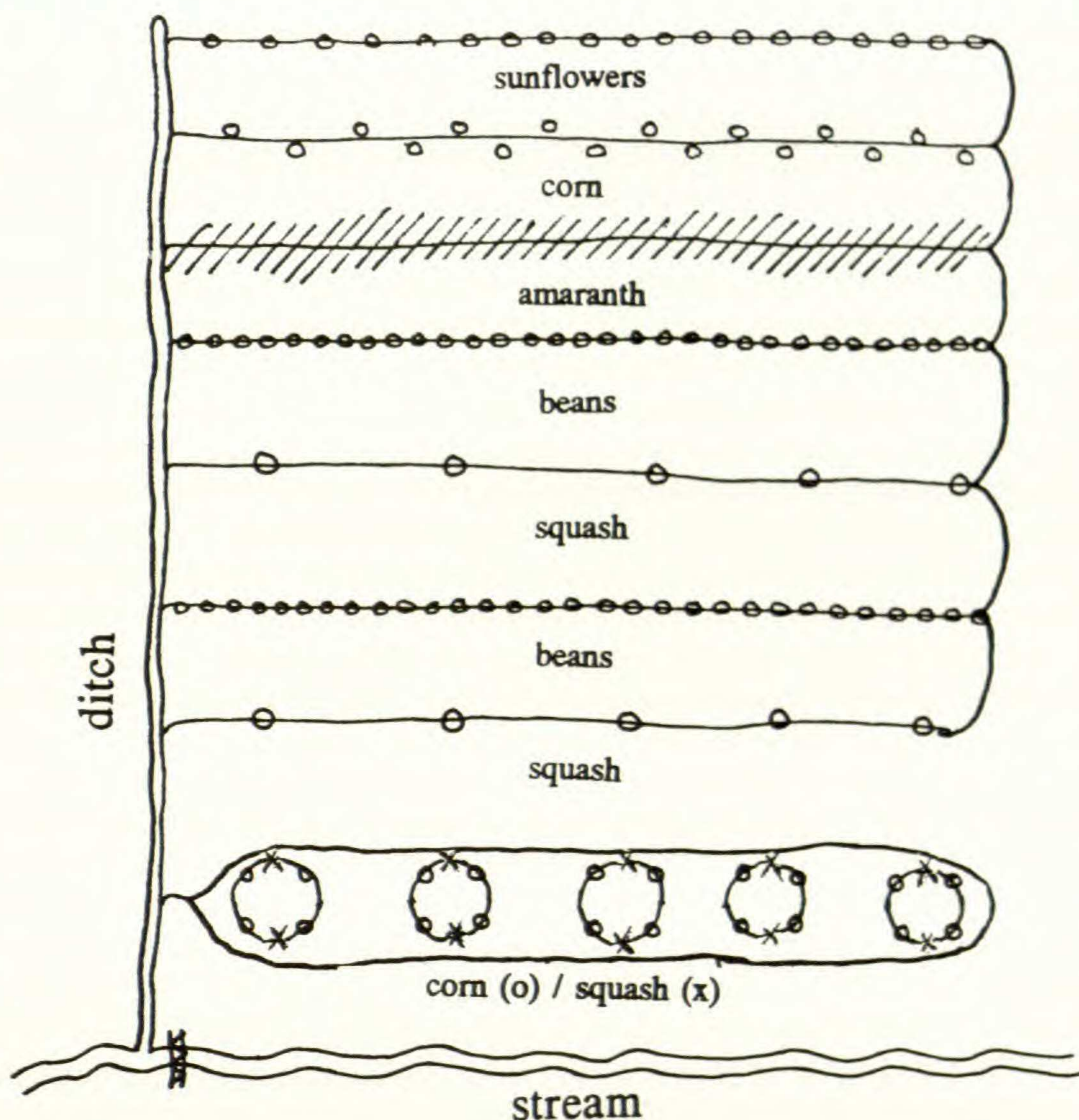


FIG. 6.—St. George Southern Paiute field plan, based on sketch by Isabel Kelly (1932–34).

Before the field was planted, the ground was soaked by means of the feeder ditches. At St. George, the people planted according to a plan in which the first row contained white corn planted in circles the length of the lateral ditch (Fig. 6). On either side of the corn within the circles two squash seeds were planted. The second field row had a soft-shelled squash. The third row contained beans, commonly teparies. The fourth had hard-shelled squash; the fifth, speckled beans; the sixth *kumuti* (*Amaranthus hypochondriacus* L.) that had been broadcast sown. The seventh row had red and blue corn alternating on opposite sides of the ditch; and the last had sunflowers (Kelly 1932–1934:SG:13–14).

While Kelly's consultants in other areas disagreed about minor details of the St. George planting plan (not all groups put in the same crops), all agreed that white corn had to be sown in the first row and that it always had to be planted in circles. Red and blue corn were kept some distance away, and might be in separate rows. The white corn was said to be a short, early-maturing variety (ca. 50 days), and the others were taller and matured later (Kelly 1932–1934:LVI:68). The

systems were said to be precontact. After Mormon settlement, people said that they merely planted in rows with no set order. All plants went in at the same time. The garden was irrigated when the corn was 2 to 3 inches tall, and again when it was a foot tall. After that, it might be watered anytime, especially if the leaves yellowed or curled. The white corn was the water gauge—if it did not grow well, some other area or system needed to be tried (Kelly 1932–1934:LVI:68).

Other methods of field planting and watering were also recorded by Kelly (1932–1934:LVI:63;M:26). At some sites at Moapa and Las Vegas, some cultigens were planted near springs and either ditches were dug from them to irrigate, or pots of water were carried to them. There were also communal fields with ditches on a grid system in some locations. In addition on the lower Virgin River and along the Colorado, corn was planted on the river margin where it did not need irrigating (Kelly 1932–1934:LVI:66–69). This type of planting is quite like that in use by the Mojave and other river Yumans (Kroeber 1925). These groups likewise contributed Spanish-derived wheat, watermelons, and chick peas to the Southern Paiute systems at some unknown data after the 1780s (Fowler and Fowler 1981).

Timbisha Shoshone gardening seems to have come from the adjacent Southern Paiute, although there is some suggestion that a least one farmer visited the lower Colorado River to obtain some seeds (Jaeger 1941:284). By the 1870s if not before, gardens featuring indigenous crops as well as introduced ones were present at Furnace Creek, Grapevine Springs, Saratoga Springs, Hungry Bill's Ranch, and Warm Springs in Death Valley, and at Warm Springs in Panamint Valley (Fowler 1992–1993; Wallace 1980). All of these featured ditch irrigation. Fruit trees and grapes were also included in some of these locations, and the garden plots sometimes covered more than an acre. Although the Timbisha and Panamint Valley people may have entered farming later than their Southern Paiute neighbors, there is good evidence that they took to it quickly and established quite extensive plots (see for example, Coville 1892).¹³

CONCLUSIONS

The various food-getting complexes just described, whether using indigenous Mojavean resources or introduced ones, seem to have been quite complementary in terms of seasons. Most groups in the Mojave Desert gathered agave during the winter and early spring; Joshua tree buds and yucca buds came in early spring; several greens and seeds were harvested in summer; mesquite was taken in late spring and summer, as were screw beans and yucca fruits. Hunting went on all year, except for prohibitions during the season when animals were mating or bearing and rearing their young.

Although these resources were probably adequate to carry small populations through most years, the addition of garden horticulture to the subsistence system probably provided a healthy margin against tough times, and seemingly also some surplus to trade. The Las Vegas Southern Paiute double cropped corn (February and May plantings, with early summer and fall harvests), thus spreading its availability through much of the year (Kelly 1932–1934:LVI:68). Tepary beans (*Phaseolus acutifolius* Gray), well known for their heat and drought resistance, made it through the hot Mojavean summers probably without a great deal

of care. Squashes (including summer as well as winter varieties) also balanced the seasons well, and provided, along with corn and beans, storable products. Amaranth, watermelons, and other plants provided some seasonal resources, but also additional storable reserves. Although this form of horticulture did require people to do some plant tending (watering, field hunting, weeding), it also left time for other subsistence pursuits. It was popular enough that Kelly (1932–1934: LVI:20–34) recorded its occurrence at roughly 70% of the Las Vegas and Pahrump band camp sites she surveyed or about which she learned.

Although we may never be able to reconstruct the subsistence pattern for Great Basin peoples in the Mojave Desert fully (see also Wilke et al. 1977 for a similar comment on the Cahuilla), these notes should help by suggesting that several aspects of subsistence were indeed complementary and probably served the people well. The Mojavean Southern Paiute and Death Valley Shoshone, not unlike their Cahuilla and Colorado River Yuman neighbors, explored this desert to good advantage, and worked out several subsistence solutions.

NOTES

¹The Great Basin Desert ranges in base elevation from roughly 3,000 ft. to 5,000 ft. in valleys with intervening ranges reaching 5,000 ft. to 11,000 ft. Annual precipitation averages 5 in. to 12 in. in the valleys with increased amounts in adjacent ranges. Temperatures are wide ranging, from -20° F. in winter to $100^{\circ} +$ in summer, and often with a diurnal of 50° . The Mojave Desert is lower in base elevation by roughly 2,000 ft., has higher annual temperature averages (below 0° F. to above 125°), and lower annual precipitation (1.4 in. to 5 in.; Bender 1980; Jaeger 1957). Maps of both are provided by Bender (1980), Benson and Darrow (1981) and Jaeger (1957).

²Isabel Kelly, whose unpublished notes are cited and used here, spent from June 1932 to March 1934 in nearly continuous field studies among various subgroups of the Southern Paiute under a National Research Council grant to study their ethnogeography. Roughly 1/4 of her data were published (Kaibab, San Juan, Panguitch; Kelly 1964). Several, but not all, of her typescript notes (excerpts from field notebooks) are on microfilm at University Archives, University of California, Berkeley. Copies of all of the excerpts, field notebooks, and other unpublished comparative data (some 3,000 Ms pages) are in the possession of C. Fowler, who is editing and otherwise preparing them for publication with permission of her literary executor. Bands represented in Kelly's notes include: Kaibab, San Juan, Panguitch, Kaiparowits, Beaver, Gunlock, St. George, Shivwits, Moapa, Panaca, Pahrnigat, Cedar City, Las Vegas (including Pahrump), and Chemehuevi. Citations in this paper are from the typed excerpts, by page number. Kelly collected roughly 200 botanical (but not zoological) specimens for identification from most groups. These were identified by personnel at the University of California Herbarium and at the California Academy of Sciences, but few were filed. Fowler's field notes and botanical specimens are in her possession.

³The use of mesquite pods in this stage is reported only for the Timbisha and not for the Southern Paiute. It is possible that this use was not recorded, but it may also be a matter of differences in preferences among groups or families, as even for sweet mesquite, the flavor is not to everyone's liking.

⁴Timing of harvests for mesquites vary considerably across the Mojave Desert, as flowering and fruiting are tied to temperature and elevation. In Death Valley, the harvest was

usually finished in early June; in Moapa, mid- to late August was the appropriate time to take fully ripened pods.

⁵The Timbisha people say that one never uses stone against stone to pound mesquite; i.e., a stone mortar and a stone pestle. No ultimate reason is given for the prohibition, but the belief is a strong one. Some Southern Paiute groups used wooden mortars and some stone, according to Kelly (1932-1934:LVI:99;M:44;CI:40).

⁶Mesquite pods can be very high in sugars and probably would ferment easily in warm weather. However, there may also be a chemical compound that produces drowsiness.

⁷The Timbisha people discarded the seeds of mesquite, as did some Southern Paiute groups (Las Vegas, Pahrump). The Chemehuevi and Moapa people sometimes ate them, but considered preparation a lot of work. They parched the seeds, pounded them to remove the endocarp, and then ground them to meal on the metate (Kelly 1932-1934: CI:40-41).

⁸In early June after completing the mesquite harvest, the Timbisha people went into the Panamint Range to collect roots, seeds, and later berries and pine nuts. They returned to winter camps in the valley in late October or November.

⁹A Chemehuevi person mentioned to Kelly (1932-1934:CI:41) that this process "sweetened" the screwbeans. Perhaps not all are naturally sweet, just as not all mesquite pods are sweet.

¹⁰Kelly (1932-1934:CI:38;LVI:94) states that both the Chemehuevi and Las Vegas people believed that a person born in mid-summer (July) should light the fire in order that it burn nice and hot.

¹¹None of these lists probably is truly exhaustive of the plant food sources utilized in this region, as all researchers worked in the area after food collecting had been disrupted by non-Native American intrusions or landscapes had been altered by mining and ranching activities.

¹²Hooked sticks, which apparently were used on chuckwallas and on cottontails, are found only in these southern desert areas within the Great Basin. The crooked stick, as was used on tortoises but probably also for other purposes, is also uniquely southern. These implements appear to be specialized tools primarily correlated with southern desert resources. Other types of wooden implements are used in food collection elsewhere in the northern Great Basin (e.g., hooked and plain pine nut poles, pointed sticks for collecting small game).

¹³The whole question of the dating of Death Valley agriculture should probably be re-assessed. Although there is apparently no archaeological evidence for it thus far at any time period (except the latest), there also has been little concerted effort to look for its traces in pollen records or by other means from the most likely areas.

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BOOK REVIEW

The Nature of Shamanism: Substance and Function of a Religious Metaphor. Michael Ripinsky-Naxon. Albany: State University of New York Press, 1993. \$57.50 (hardcover); \$18.95 (softcover). Pp. xii; 292. ISBN 0-7914-1385-3 (hardcover), 0-7914-1361-1 (softcover).

This volume synthesizes a wide-ranging literature in seven languages on shamanism, incorporating with it the author's own experiences and perspectives. It can be read as an introduction to the subject. Two of the seven chapters focus on the ethnobotanical dimension of shamanism, enough coverage to justify a book review for this journal.

Professor Ripinsky-Naxon views shamanism as a manifestation of the universal human quest to make larger sense of the relationship among the humans, natural forces and the unseen world. Ethnographic data, archaeological finds, past events, mythologies of the ancients and Jungian psychology are interwoven into a cultural-historical framework in which consciousness and intentionality are viewed as growing out of the collective unconscious.

Shamans have cross-culturally manifested similar kinds of reactions to outside forces and natural phenomena. An example would be the ability to trigger altered states of consciousness with quartz crystals and gold (which may have led them to become objects of human value in the first place). Also described are phosphenes—luminous images caused by excitation of the retina—that predisposed certain individuals in very different parts of the world to tie them to visionary experiences.

Ripinsky-Naxon is convinced that use of entheogenic substances, which he prefers to call hallucinogens, forms a pattern of great antiquity and centrality. Here he stands at odds with the historian of religions, Mircea Eliade, who for most of his life viewed the use of hallucinogens as an aberrant and recent innovation in culture history. The author avers that psychotropic plants were an early and major vehicle for achieving an altered state of consciousness. Shamanic use of mind-expanding substances can be inferred from cave art as far back as the Upper Paleolithic. Shamanic residues are apparent in complex religious systems as diverse as the Osiris cult of the ancient Egyptians, the animal-headed St.